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## PHENOL ADSORPTION ON A PERMEABLE REACTIVE BARRIER (PRB) OF ACTIVATED CARBON IN VARIOUS pH CONDITIONS

Phenol is a toxicant from the petrochemical, resin, and pharmaceutical sectors and pollutes soil and water bodies. This work aimed to investigate the applicability of activated carbon (AC) as a material for a permeable reactive barrier to remove phenol from groundwater flow. Filtration tests were conducted through the AC layer using 1 mM phenol solution in vertical and horizontal reactors. The probes in the vertical reactor of 50 mL were conducted with AC mass of 1.3 g, solution volume of 50 mL, and flow velocity of 0.0015 L/min during ~30 min, whereas 10 g of AC and 500 mL of phenol solution were used in trials of ~220 min with the horizontal reactor of 36 cm<sup>3</sup> at optimum velocity of 0.002 L/min. The influence of pH (3, 7, 11) was studied. The remaining phenol concentration was determined by UV-Vis spectrophotometry in a 1-cm width quartz cuvette. For the vertical reactor, the average phenol removal at pH 3, 7, and 11 was 92%, 95%, and 83%, respectively. Phenol retention increased for pH 3 until 15 min (87% to 94%), then remained almost unchanging (93%). It was close to constant for pH 7, varying between 93% and 96%. Oppositely, it decreased nearly monotonically for pH 11 from 93% to ~73%. In the horizontal reactor, phenol removal changed with time, almost like in the vertical one. The average phenol removal for acidic, neutral, and basic conditions was 94%, 92%, and 90%, respectively. In an additional test at pH=3 with the higher flow rate (0.02 L/min), the maximum and average retention decreased to 90% and 88%, respectively. Finally, a test with "soil:AC" ratio of 50:1 and AC mass of 1.3 g was conducted in the horizontal reactor. Phenol removal did not exceed 5% in that case.

### Keywords

adsorption, phenol, activated carbon, permeable reactive barrier.

### Reference

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### Author approval

I confirm

### Author will attend

I confirm

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